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TIMBER MANAGEMENT PLAN

GENERAL TIMBER MANAGEMENT STATEMENT

BIGHORN NATIONAL FOREST

WYOMING
REGION 2

1959

REGION TWO

FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE

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GENERAL TIMBER MANAGEMENT STATEMENT

BIGHORN NATIONAL FOREST

WYOMING
REGION 2
1959

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Experiment Station

GENERAL TIMBER MANAGEMENT STATEMENT

U. S. DEPARTMENT OF AGRICULTURE

BIGHORN NATIONAL FOREST - REGION 2

WYOMING

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Initials of Reviewer for Division or Experiment Station:

Region or Station			Washington Office	
Initials	Date		Initials	Date
CCA	11/3/59	Timber Management	LJM	3/6/60
BKC	9/22/59	Range Management	FCC (A)	1/26/60
MFB	9/25/59	Wildlife Management	LWS	1/25/60
NMR	9/25/59	Recreation and Lands	JS	1/22/60
NMR	9/25/59	Watershed Management	WLS	1/19/60
WKN	9/28/59	Engineering	CTS	1/15/60
STM	10/26/59	Fire Control	MSL	1/14/60
GLH	11/23/59	Research	CEO	1/8/60
		Pest Control	CPW	12/29/59
		Land Adjustments	AGL	1/5/60

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INTRODUCTION

The timber management plan for the Bighorn National Forest is in two sections. (1) General Timber Management Statement, and (2) Working Circle Plan.

The timber management statement contains general background material such as the location and description of the forest, its condition, coordination with other uses and a statement of the long-range objectives of timber management.

The working circle plan contains the short-term objectives and programs. It also includes calculations of allowable cut, the cutting budgets and planned road construction, reforestation, and timber stand improvement work.

Revision of the statement should be infrequent. The working circle plan, however, will be revised at least once every 10 years to fit changing conditions.

The resource manager applying the timber management plan must be familiar with the provisions of the Multiple-Use Land Management Guide for the Eastern Wyoming Subregion, the Land Management Plan for the Bighorn National Forest and the forest plans for other resources.

LOCATION

Map #1 shows the location of the Bighorn Working Circle in the State of Wyoming and its position relative to other timber producing areas.

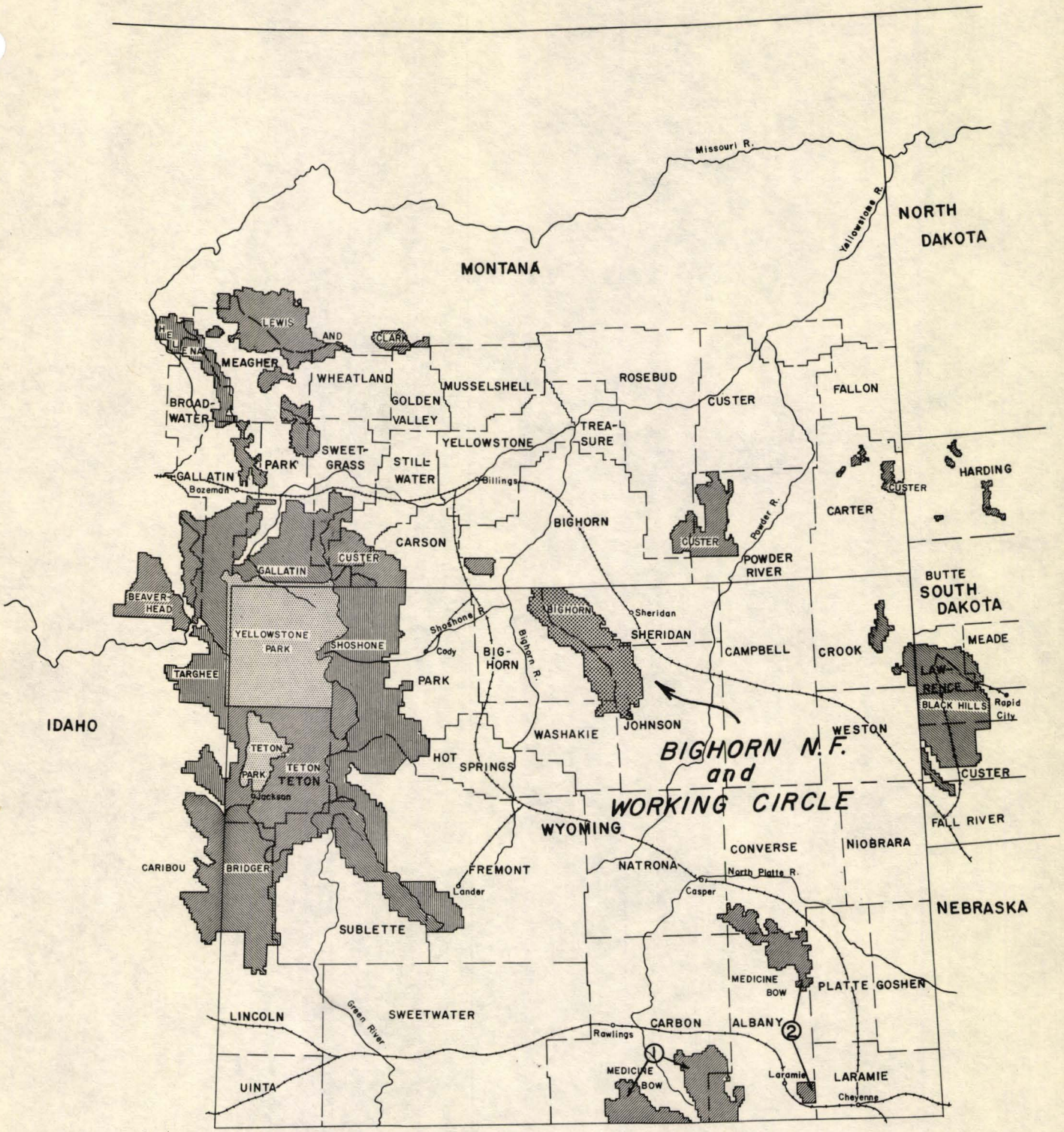
Map #2 shows the forest ranger districts, major transportation routes and communities with their population.

Map #4 shows the subdivisions of the Bighorn Working Circle.

FOREST DESCRIPTION

Table #1 shows the area of the Bighorn National Forest by ownership.

Chart #1 shows the area of commercial forest land by percentage of timber types. Table #2 gives area by timber types, stand size and stocking classes.



R·2 FORESTS IN WYOMING

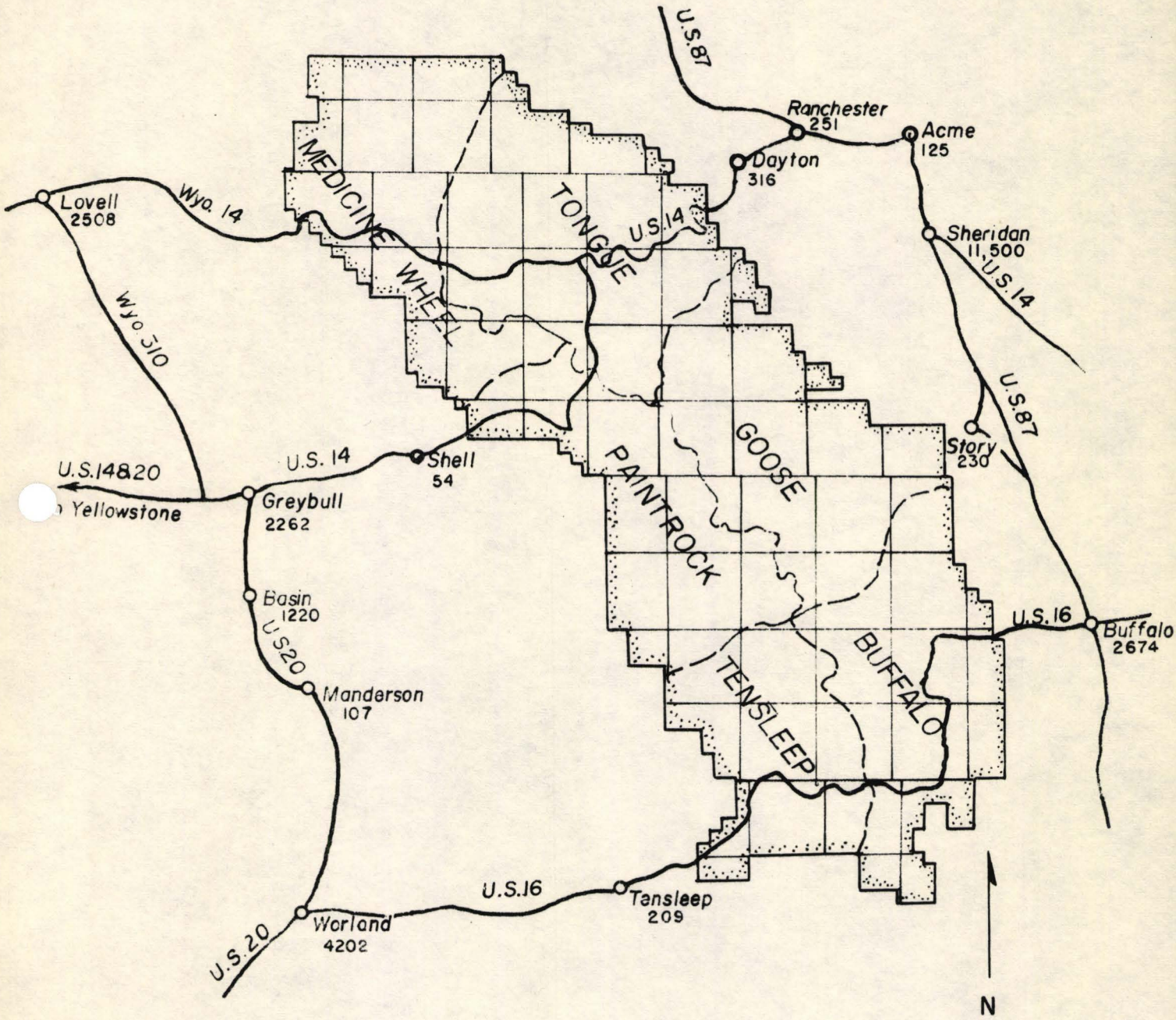
AND

ADJACENT FORESTS OF OTHER REGIONS

Map 1

MAP SHOWING LOCATION OF RANGER DISTRICTS
and
POPULATION OF ADJACENT COMMUNITIES

BIGHORN NATIONAL FOREST
WYOMING



Scale $\frac{1}{2}$ Inch = 6 Miles

Map 2

1958
W.W.W.

Table 1

Area By Ownership

Acres

Ranger District or Block	Total Area		Commercial Forest Land			
	Gross	Net	National Forest	State	Private	Total
Buffalo	186,573	185,325	126,843	120	254	127,217
Goose	201,275	199,195	127,050	-	1,510	128,560
Medicine Wheel	189,135	188,815	94,005	70	-	94,075
Paintrock	167,221	167,061	63,385	-	-	63,385
Tensleep	138,340	137,420	64,667	-	255	64,922
Tongue	230,880	227,828	151,652	710	315	152,677
Total	1,113,424	1,105,644	627,602	900	2,334	630,836

Area of Commercial Forest Land by Timber Types

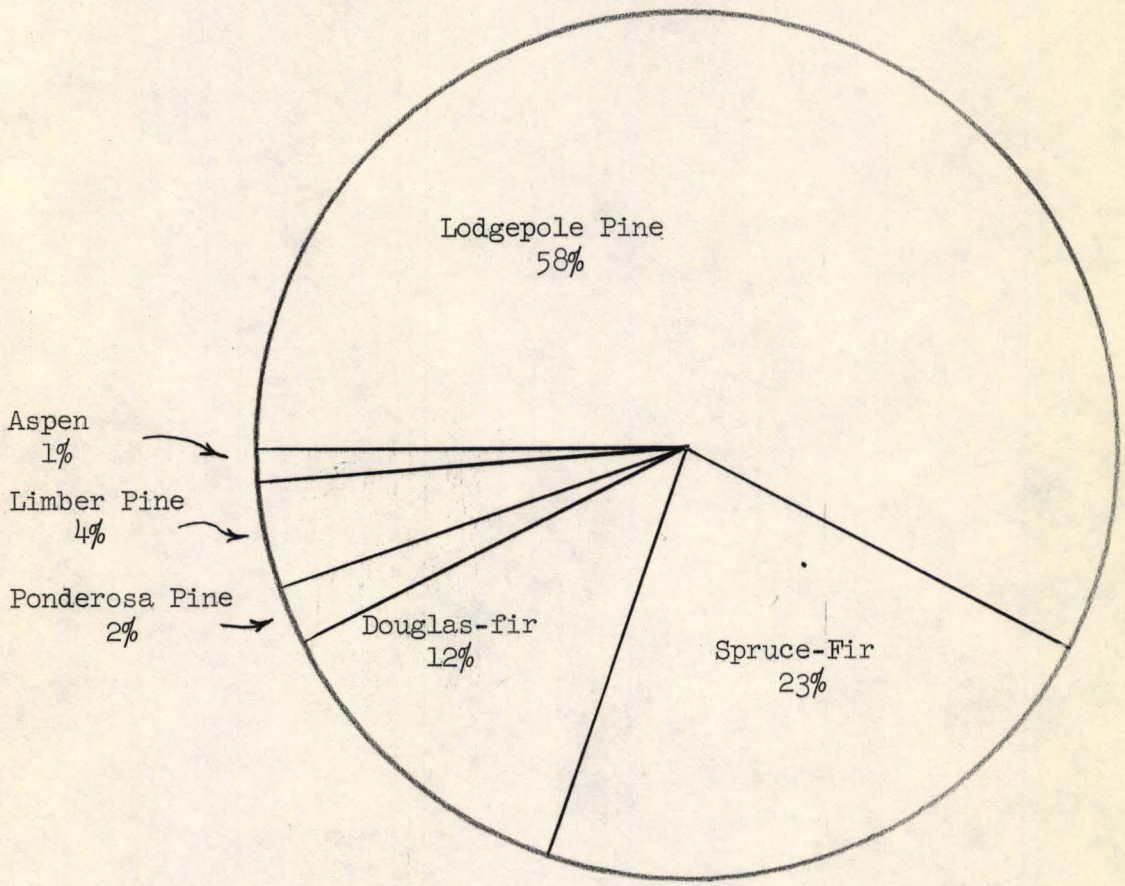


Chart 1

Revised 9/1/61

Table 2

Area of Commercial National Forest Land By Timber Type
Stand Size and Stocking Class

(Acres)

Timber Type	Large Sawtimber			Small Sawtimber			Poletimber				Seedling-Sapling				Non-stocked	Total
	Med.	Poor	Total	Med.	Poor	Total	Well	Med.	Poor	Total	Well	Med.	Poor	Total		
Douglas-fir				7,555	29,341	36,896	12,530	12,145	4,715	29,390	3,455	1,635	1,035	6,125	5,780	78,191
Ponderosa Pine				100	8,174	8,274	665	1,915	2,304	4,884	40	160	75	275	270	13,703
Lodgepole Pine				8,675	95,999	104,674	36,568	153,853	27,134	217,555	22,704	12,634	1,750	37,088	3,220	362,537
White Pine Group					190	190	700	5,440	9,565	15,705	210	610	3,770	4,590	3,520	24,005
Spruce-Fir	660	80	740	12,895	90,097	102,992	2,550	12,999	17,704	33,253	240	980	500	1,720	5,045	143,750
Aspen					75	75				3,856				1,455	30	5,416
Total	660	80	740	29,225	223,876	253,101	53,013	186,352	61,422	304,643	26,649	16,019	7,130	51,253	17,865	627,602

STAND CONDITION

Table No. 3 gives age and growth data for the timber types on the Bighorn.

Lodgepole Pine Type

This type occurs on 58 percent of the commercial timberland area in the Bighorn Working Circle. It is found mostly in pure, even-aged stands in which growth is at a standstill from overstocking, overmaturity, and the prevalence of dwarfmistletoe. Many of these stagnated stands are poles 8"-10" d.b.h., frequently interspersed with stands of small sawtimber of about the same age.

Engelmann Spruce Type (Spruce-fir Type)

This type occurs on 23 percent of the commercial timberland area in the working circle. It is likewise found mostly in pure, even-aged stands, usually with less than 10 percent alpine fir. Its natural range is between the lodgepole pine and timberline, with stringers along the cool stream bottoms well down into the lodgepole type.

Most of the trees of small sawtimber size in this type are overmature. The stands of saplings and poles are, however, putting on fair growth and the general stand condition is much better than in the lodgepole type.

Douglas-fir Type

Twelve percent of the commercial forest area is in the Douglas-fir type. It occurs at the lower elevations, principally on north and east exposures, usually in steep, rocky country. Ponderosa and limber pine are associated species in the type. The older stands, usually in the small sawtimber class, are overmature and are putting on very little growth. Pole stands are putting on fair growth. The type will not be a major producer of sawtimber, principally because the steep, rough site limits operability under usual logging methods and stands are not sufficiently extensive to warrant use of special equipment. Defects such as ringshake are prevalent and lower the quality of Douglas-fir for sawtimber.

Minor Types

The ponderosa pine, limber pine, and aspen types total only 7 percent of the commercial timber area.

Ponderosa pine is the only species of the three that has commercial value. It occurs mostly in the cutover lower area on the steep, eastern slope of the Bighorn range. Growth is good in the pole class and satisfactory in the small sawtimber class. The stands are mostly understocked.

Prevalence of Disease and Insects

There are at present no epidemic infestations of insects on the Bighorn.

In a survey conducted by Frank G. Hawksworth on the occurrence of dwarfmistletoe, (Arceuthobium Americanum Nutt), in lodgepole pine on the Bighorn, Roosevelt, and Medicine Bow in 1953 to 1955, 31% of stands observed on the Bighorn were infected with this disease. The prevalence of the parasite was greatest in cutover areas, 48% in observations of roadside strips. Dwarfmistletoe was found in 32% of virgin stands, 16% of regenerated burns. The incidence of dwarfmistletoe was lightest in regenerated burns because the fires had been severe enough to destroy a large proportion of infected overstory trees. For management purposes it can be assumed that all overmature stands of lodgepole pine are infected with dwarfmistletoe.

TABLE #3*

STAND CONDITION OF COMMERCIAL TYPES

TYPE	LP9A	LP8	LP7	SF9A	SF8	SF7	D9A	D8	D7	P9A	P8	P7
Average Age, Yrs.	155	90	37	203	78		173	60		131	50	
Age Range	73-287	40-258	31-55	73-459	39-110		63-297	42-90		81-227	40-75	
Avg. radial growth of last 10 yrs.(inches)	.25	.35		.35	.57		.30	.50		.50	.70	
Avg. DBH	13.0	7.3	3.4	15.6	7.6		14.2	7.5		14.1	7.4	

* Above data on average dominants and co-dominants of stand and taken from survey plots

LEGEND

LP Lodgepole pine
SF Engelmann spruce-Alpine fir
D Douglas-fir
P Ponderosa pine

7 Seedling, sapling, 0" - 4.9" d.b.h.
8 Pole, 5.0" - 10.9" d.b.h.
9A Small sawtimber, 11.0" - 20.9" d.b.h.

RESULTS UNDER PREVIOUS PLANS

Prior to July 1, 1956, the Bighorn was divided into four working circles with a complete timber management plan for each. Table #4 summarizes pertinent data regarding these.

Beginning July 1, 1956, all the working circles were consolidated into one which included the entire forest, and the annual allowable cut for the Bighorn Working Circle was revised to 15,000 M.B.F.

In the management plans for the four original working circles, a rotation of 160 years was selected which was divided into four cutting cycles of 40 years each. Figure #1 shows the comparison of actual cut to allowable cut for the four original working circles through June 30, 1956; and through January 1, 1968, for the entire Bighorn Working Circle by projecting planned cutting from the present to the end of the first 40-year cutting cycle. It was estimated that 1,022,317 M board feet of merchantable timber 10 inches and more d.b.h. should be cut during the first cutting cycle. On the basis of past cutting and future cutting plans through January 1, 1968, approximately 254,357 M board feet will have been cut, leaving a surplus of 767,960 MBF of merchantable timber, assuming original total volume estimates for the Bighorn Forest were correct.

In the original management plans, reliance was placed on a sustained market for railroad ties to absorb approximately 90% of the merchantable volume of lodgepole pine and Douglas-fir. It was believed that within 10 years from the writing of the plans, demand for sawtimber would increase so that the annual allowable cut would be achieved.

Figure #2 shows yearly cut on the four working circles from 1927 through 1955. Figure #3 shows yearly cut for the entire Bighorn through Fiscal Year 1958. The greater rate of cutting from 1927 through 1931 reflects cutting for the tie market which declined early in the depression years. Cutting then remained at a low level through the depression and did not start to rise until the end of World War II. Since then, cutting has been more or less on the upswing as total demand for timber products increased. The failure of the tie market and the lag in the development of new markets have resulted in failure to attain the objectives of the original timber management plans.

TABLE #4

PREVIOUS PLANS

Working Circle	Date of Approval	Area of Commercial Forest land - Acres	Total Volume MBF	Annual Allowable Cut
Buffalo	4/6/28	158,858	248,797	4,754 MBF
Porcupine	4/6/28	75,860	258,703	4,683 MBF
Tensleep	3/30/28	71,546	382,272	7,284 MBF
Tongue River	4/6/28	273,526	461,735	8,838 MBF
Forest Total		579,790	1,351,507	25,559 MBF

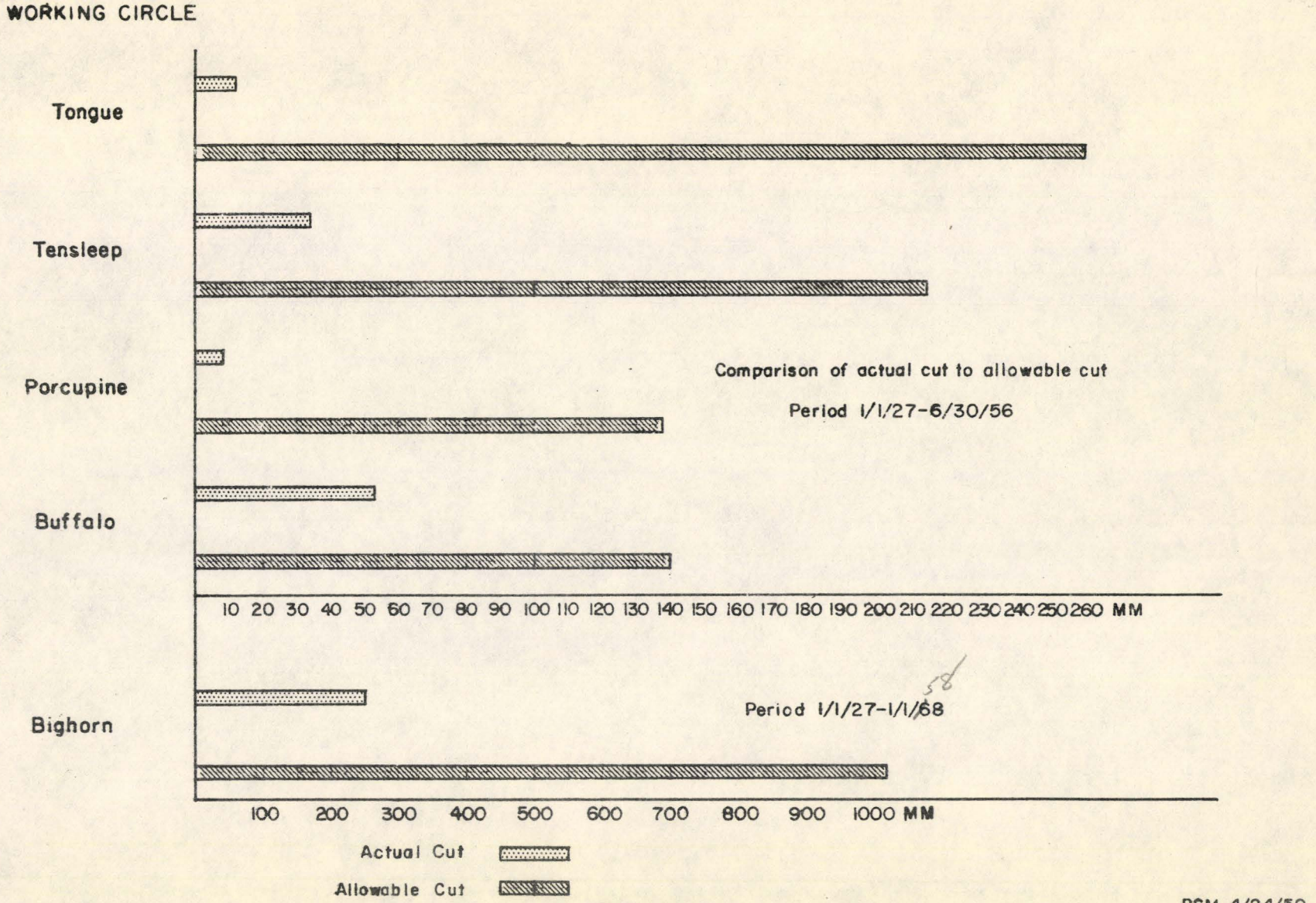
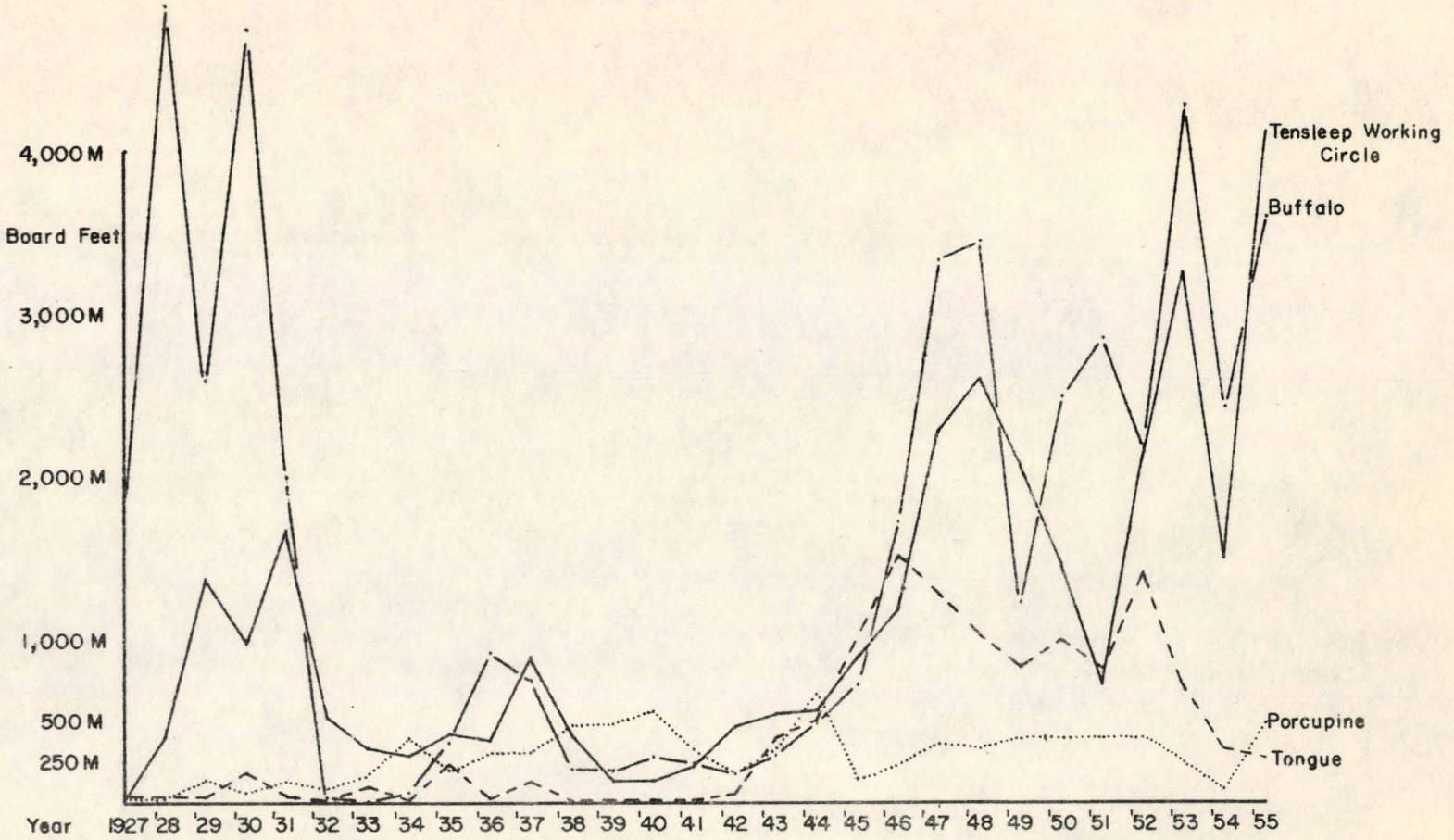

WORKING CIRCLE
Tongue
Tensleep
Porcupine
Buffalo
Bighorn
Comparison of actual cut to allowable cut
Period 1/1/27-6/30/56
Period 1/1/27-1/1/58
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 MM
100 200 300 400 500 600 700 800 900 1000 MM
Actual Cut
Allowable Cut

Figure 1

PSM 4/24/59



Yearly Cut Chargeable to Allowable Cut

Figure 2

PSM 4/24/59

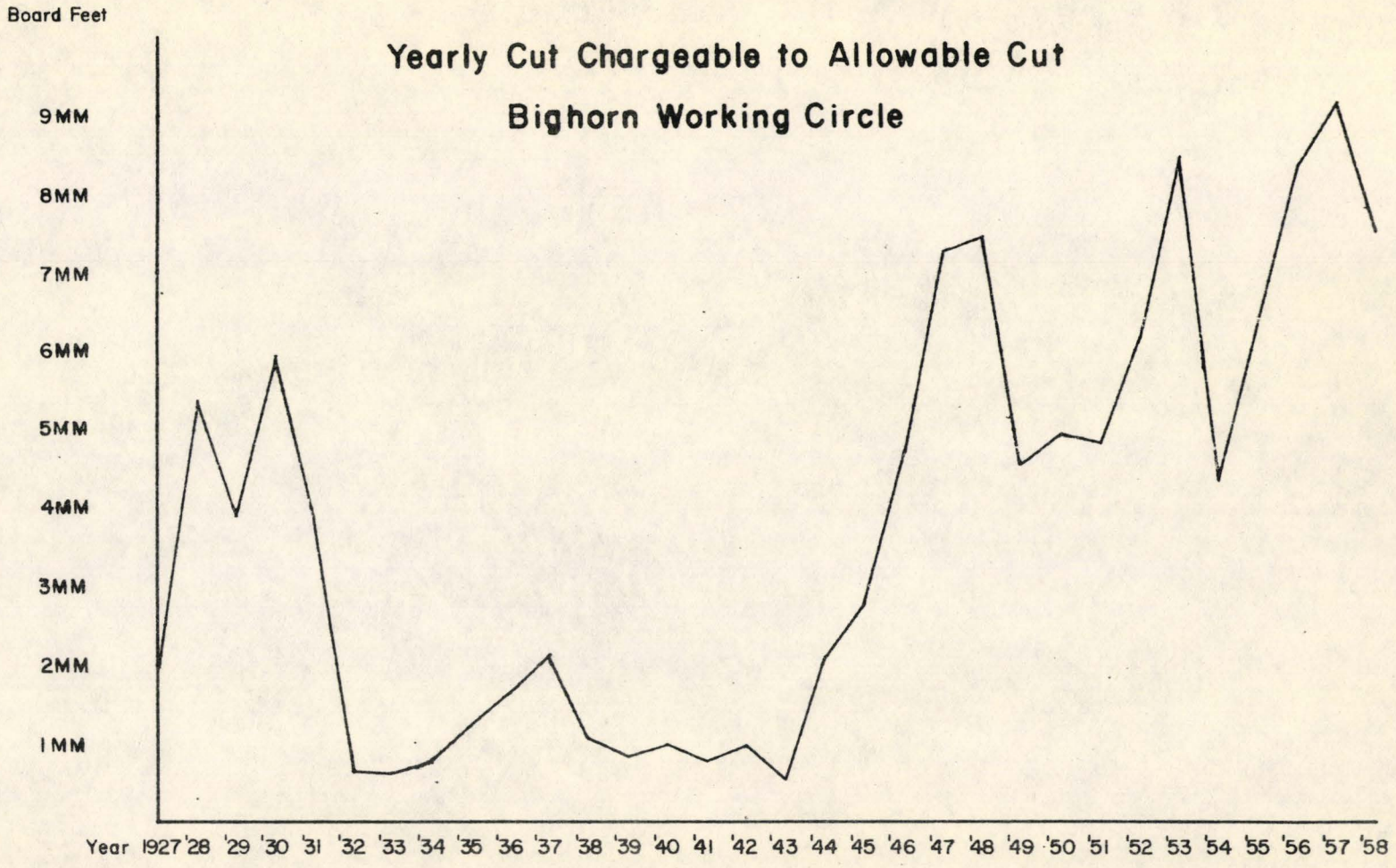

Board Feet
Yearly Cut Chargeable to Allowable Cut
Bighorn Working Circle
9MM
8MM
7MM
6MM
5MM
4MM
3MM
2MM
1MM
Year 1927 '28 '29 '30 '31 '32 '33 '34 '35 '36 '37 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 '48 '49 '50 '51 '52 '53 '54 '55 '56 '57 '58

Figure 3

PSM 4/27/59

SILVICULTURAL SYSTEM

In the original timber management plans for the four working circles of the Bighorn, the "Marking Policy Statement" of February 1, 1926, was followed. In general, the selection cutting system was applied to all species. Clear cutting was used only in areas of fire or wind damage, insect injury, or stagnation beyond the point of recovery.

Ponderosa pine was to be grown for sawtimber. Mature or decadent trees were cut unless needed for seed trees.

Small products such as mine props, fence posts, telephone poles and railroad ties were to be cut from lodgepole pine. Generally, all trees large enough for ties were cut. Sufficient trees were to be left in lodgepole pine stands to insure wind-firmness.

Sawtimber and ties were to be cut from Douglas-fir and Engelmann spruce. Generally, in Douglas-fir, lodgepole pine and ponderosa pine, all trees over 13 inches d.b.h. were to be taken. Approximately 60% of the merchantable volume of spruce was to be cut.

The 1926 marking rules were superseded by the "Marking Policy Statement" for the Bighorn National Forest of June 19, 1940. In these rules the selection method was continued for all types with the same provision for deviation as stated in the 1926 rules. Crown classifications were used for marking ponderosa pine and lodgepole pine.

By 1940, the demand for railroad ties had seriously decreased, so the general rule of taking all trees 13 inches and more in d.b.h. in lodgepole and ponderosa pine and Douglas-fir stands was revised and larger trees were to be left if thrifty. In overmature decadent stands, clear cutting was recognized as proper treatment, leaving only small trees. Clear cutting normally applied only to lodgepole pine.

In both the 1926 and 1940 policy statements the desirability of thinnings in immature, overstocked stands was recognized. Little hope was expressed, however, for much accomplishment since there was no market for the material cut in such thinnings.

By 1956, clear cutting by groups, strips, or blocks, was in use in the lodgepole pine and Engelmann spruce types and has been continued to the present. On these areas, which normally include about 50% of the total sale area, all trees 10.0 inches and over in d.b.h. are cut. In the limited ponderosa pine and Douglas-fir stands, clear cutting in patches is applied with the objective of even-aged management. Timber harvesting along roadsides, recreation areas, streamsides and water fronts will be for the purpose of protecting, improving and maintaining stands of timber adequate for the use to be made of the particular area.

Past cutting on the Bighorn Working Circle has not been sufficiently intensive to have had a significant effect in fulfilling the silvical objectives of past timber management plans.

MANAGEMENT OBJECTIVES

The ultimate sustained yield capacity is at least 100 MM B.F. annually, based on 627,602 acres of commercial forest land with 100 board feet per acre as a reasonable increment. To attain this objective, the entire working circle must be brought under intensive management and all desirable practices such as thinning and disease control employed to increase growth to its potential. A balanced distribution in areas of growing stock of intermediate ages will need to be obtained to furnish a continuing supply of mature timber for each year's cut.

Short-term (10-year) programs directed toward securing desirable growth will be included in the working circle plans. These programs will be guided by the following:

1. All overmature timber will be harvested within the next 40 years. The allowable cut will be reviewed and recalculated at least every 10 years. The length of the liquidation period for overmature stands may be adjusted as better information is progressively obtained in such matters as volume, growth, and economics.

2. Reduce infections of dwarfmistletoe and other diseases to within endemic levels. About 30% of the lodgepole pine stands on the Bighorn Working Circle are heavily infected with dwarfmistletoe. Losses from this disease in lodgepole pine sawtimber stands are as high as 3,000 board feet per acre.

3. Keep insect infestations within the current endemic level.

4. Keep fire damage within the PAR objective.

5. Initiate a reforestation program that will:

   a. Assure, through fill-in planting, adequate stocking on cutover areas within 3 years after cutting.

   b. Reforest within the next 20 years, some 25,000 acres of poorly or nonstocked commercial forest lands such as old burns.

6. Develop a desirable distribution of age classes in lodgepole pine in the first rotation period and in Engelmann spruce in the first two rotation periods.

7. Reduce overstocking in lodgepole pine stands less than 70 years of age by commercial and noncommercial thinnings. There are about 100,000 acres of lodgepole pine in need of such thinning.

A large part of the job of improving growing conditions will be done through commercial sawtimber sales and related sale area betterment work. During

the past 10 years, local industry harvested only 52 percent of the allowable cut. Doubling of mill capacity and timber sales will be accomplished by FY 1965.

To provide for commercial thinnings and to utilize material from old cutover areas, a program will be initiated to establish a forest industry to utilize small, round material from trees not suited for sawlogs. Such an industry should be established by 1970.

An essential part of the forest's program for meeting timber production objectives will be a continuing public relations program, included in the I&E plan, for educating the public in the benefits from proper silvicultural and timber harvesting practices.

High priority will be given to training all forest employees so that a high standard of performance will be maintained in the timber management field. Methods employed will include on-the-job training, self-training, and group training.

TRANSPORTATION

Railroads and Railheads

The Bighorn area is served by the Chicago, Burlington & Quincy Railroad of the Burlington Route, which has railheads at Sheridan, Ranchester, and Parkman, Wyoming; and at Wyola, Montana to the east and north of the Bighorn Forest. To the west, the CB&Q Railroad has railheads at Worland, Greybull, and Lovell, Wyoming.

Highways

Map #2 shows the highways in and adjacent to the Bighorn Forest. Highways 14 and 16 are paved. Highway U. S. 14 from Dayton is being improved and widened. Highway U. S. 16 is being relocated and widened in Tensleep Canyon on the southwest side of the Bighorns. At the present time, sharp switchbacks near the forest boundary in the road from Dayton, in Shell Canyon on U. S. 14, and in Tensleep Canyon on U. S. 16 are some obstacles to the movement of logging trucks.

Highway U. S. 16 from Buffalo to Tensleep is kept open all winter as is Highway U. S. 14 from Dayton to Shell. The State Highway Department plans that within two years Wyoming #14 will be kept open during the winter.

Forest Development Roads - General Picture and Long-Range Needs

The Bighorn has suffered in the past from the lack of development roads, particularly timber access roads. This probably accounts at least in part for failure of the actual cut to approach the allowable cut. In general, roads other than the three main highways are inadequate for heavy truck traffic.

To harvest the allowable cut, timber access road construction totaling 2,080 miles is needed. In addition, betterment is needed in existing secondary roads which will be used for timber harvesting.

Table #5 summarizes the forest development transportation plan as of June 30, 1958.

TABLE #5

SUMMARY OF NATIONAL FOREST DEVELOPMENT

TRANSPORTATION PLAN AS OF JUNE 30, 1958

Primary Forest Value	Existing Miles	Additional Need Miles	Total Miles
Timber	162.7	2,079.9	2,242.6
Administration & Fire	131.4	62.5	193.9
Other Resources	183.0	36.4	219.4
Total	477.1	2,178.8	2,655.9

REFORESTATION

Summary of Past Work

From 1909, when the first plantings apparently were made, to 1915, there were 306 acres of land planted on the Bighorn in areas ranging from .15 acres to 74 acres. Most of these were less than 10 acres in size. Although most of the areas were seeded with ponderosa pine or Douglas-fir, seedling trees were planted on five areas. All the projects were failures.

From 1915 to 1939 a few experimental areas of six acres or less were planted. These attempts likewise resulted in failure.

In 1939, 190 acres were planted to seedlings by CCC labor on Wolf Creek above Eaton's Ranch. The planting failed. Losses were attributed to drought and browsing of deer. Other plantings, totaling 77 acres, in the same year were made in the vicinity of Steamboat Point and on Crazy Woman Creek. These were also unsuccessful.

In 1940, 81 acres were planted to Douglas-fir near Black Mountain. The planting failed. Loss was attributed to winter-kill, unfavorable site, and to sod competition.

In 1950, two experimental plantings were made, each an acre in size, one near Shell Ranger Station and the other just off Highway U.S. 14 on Granite Creek. Ponderosa pine and Douglas-fir seedlings were used. The plantings failed, apparently from drought and from competition from ground vegetation.

The same year an area of 10 acres near Copeman's Tomb was planted to Douglas-fir and ponderosa pine seedlings. The planting was unsuccessful because of drought and damage from big game.

Long-range Needs

The results of the above described projects emphasize the need for careful, pre-planting consideration of site suitability, ground preparation and protection from animals.

Priority for reforestation will be given the 25,000 acres of burned-over forest land and commercial forest land less than 10% stocked. Next priority will be given poorly-stocked commercial forest land (10% to 35% stocked). In this class, first consideration will go to areas in the lower range of stocking, including clear-cut areas and old burns not adequately regenerating.

Re-establishment of commercial species will be considered, particularly in the scattered aspen type and on the more favorable sites on the north-east side of the Bighorn where limber pine is coming in over large areas of old burn.

TIMBER STAND IMPROVEMENT

Long-range Needs

Table #6 is a summary of past timber stand improvement work on the Bighorn.

Immature lodgepole pine stands are generally much too dense for maximum growth. There are on the Bighorn about 60,000 acres of such overstocked stands. In addition, there are 14,000 acres, classed as well-stocked, but on which growth could be substantially increased by thinning.

Douglas-fir immature overstocked stands occupy 16,000 acres and Engelmann spruce in this class totals 2,800 acres.

In immature timber, one noncommercial thinning will normally be required in the sapling stage; at the same time, dwarfmistletoe in any residual overstory present on the area should be eliminated.

Timber stand improvement plans will be prepared for all timber sales, and K-V deposits will be set up for accomplishing the timber stand improvement job on sale areas. For non-sale areas, a market will be encouraged for small round products, thus making commercial thinnings possible on a substantial area.

TABLE #6

Name of Improvement	No. Acres	Description	Location
Merle Creek Thinning	18.8	Thinning LP reproduction	Sec. 30, T. 49 N, R. 84 W.
Crazy Woman Thinning	54.0	Thinning LP reproduction	Sec. 31, T. 49 N, R. 84 W. Sec. 1, T. 48 N, R. 85 W.
Moose Creek Thinning	4.6	Thinning LP reproduction	Sec. 35, T. 50 N, R. 84 W.
Webber Park Thinning	3.0	Thinning LP reproduction	Sec. 18, T. 49 N, R. 83 W.
Clear Creek Thinning (CCC)	700 (est.)	Thinning LP reproduction	Clear Creek drainages T. 50 N., R. 84 W.
Dayton Thinning (CCC)	480 (est.)	Thinning LP reproduction	Sec. 15, 16, 21, 22, 26, 27, T. 56 N., R. 87 W.
Cutter Creek Thinning (CCC)	905	Thinning LP reproduction	Sec. 31 & 32 T. 56 N., R. 87 W. Sec. 25, 26, 35, 36, T. 56 N., R. 88 W.
Total acreage thinned	2,165.4	Remarks: The CCC thinnings were done from 1934 - 1940. The remainder were done in the early 1950's.	

PROTECTION

Disease

The loss from mortality and in retarded growth from dwarfmistletoe in maturing and mature stands of lodgepole pine is a problem of major importance on the Bighorn. The occurrence of dwarfmistletoe on the Bighorn was studied in 1953 to 1955 by Frank Hawksworth, forest pathologist. His findings are summarized in the "Stand Condition" section of this statement.

Historical descriptions of the Bighorn do not mention mistletoe. In pictures taken in 1900 by Professor J. G. Jack for his forest examination report of the Bighorn, however, witches brooms and the characteristic thinning crowns of mature lodgepole pine infested with mistletoe appear. This source of loss has likely been as prevalent in lodgepole pine in the past as it is now.

Two rust diseases, Comandra rust (Cronartium comandrae) and western gall rust (Peridermium harknessii) are important on the Bighorn and will be considered in lodgepole pine management.

Losses in mature sawtimber of all commercial species principally from heart rot and butt rot cause an average defect of 16% on commercial sawtimber sales on the Bighorn.

Insects

Losses from insect infestations do not appear to have been extensive in the past and lodgepole pine seems to have suffered less from insects than have other species.

In the history of the Bighorn, only isolated cases of insect infestations are mentioned. Apparently, no treatment of infested areas was undertaken until 1936 and 1937 when 1,231 trees attacked by the Douglas-fir bark beetle, (Dendroctonus pseudotsugae), were treated in the Cedar Creek-Grouse Creek area of the Paintrock District. An estimated 246 MBF of timber was killed.

During 1954, an infestation of the Black Hills Beetle, (Dendroctonus ponderosae), in ponderosa pine was treated in the Story and Rock Creek areas of the Goose and Buffalo Districts. The infestation covered an estimated 10,000 acres of commercial forest land (6,000 acres of national forest, 1,000 acres of other federal lands, and 3,000 acres of state and private land). A total of 673 trees were treated in a cooperative federal, state, and private project. An estimated 500 MBF of timber was killed in the insect attack.

Other than in the specific instances mentioned, timber losses from insects have been low in the recent past on the Bighorn Forest.

Animals

In his report of 1900 on the Bighorn, Professor Jack noted that teee growth on many hundreds of acres of the Bighorn had been adversely affected by the grazing of sheep. At that time, 205,250 sheep were

permitted on the Forest Reserve from June 1 to September 20. Numbers were excessive with relation to available forage and damage to tree seedlings, young trees, and to low-hanging foliage of larger trees was very evident. This source of loss is no longer important since there has been a reduction in permitted numbers of sheep (to 73,614), a shortened grazing season, improved methods of herding, and better control of trespass.

Past damage to timber from cattle grazing has always been negligible.

Loss from big game is minor, except on the small areas of planting.

Among smaller animals, porcupines cause the greatest damage and loss. The problem has been considered endemic on the Bighorn, but will be watched for evidence of possible increase. Snowshoe rabbits and small rodents also cause some damage to seedlings and saplings, but no considerable loss has occurred.

Fire

Fires from various causes have covered most of the Bighorn Forest.

In September, 1899, the Tongue River fire burned 50,000 acres in T. 56 N., R. 88 W. In the following year, fires on the Big Goose and Cross Creek drainages burned 12,000 acres, and a fire on Tensleep Creek burned another 13,000 acres.

After 1900, as forest protection became more intensive, the size and occurrence of fires was sharply reduced. Table #7 shows the size, location, and dates of fires of 1000 acres and more from 1909 until the present. Figure #4 shows the area burned each year for the period 1938-1958.

Timber sale slash disposal and fire plans will provide measures to give cut-over areas the same degree of protection as was available prior to cutting. These measures may include slash disposal or supplemental protection, or both. Prompt action will be taken under these plans to avoid accumulative slash build-up which would form continuous areas of high or extreme fire hazard.

Weather

In September 1923, a heavy, wet snow deposited 6.17 inches of moisture on Sheridan, and at least that much on the Bighorn Forest. This storm caused extremely heavy timber breakage and downfall. In a survey on the J. H. McShane sale of 6/22/05, in the vicinity of Woodrock, a tally of trees that fell during the 1923 storm was made, and compared with the number which had fallen during the entire 14 to 17 years since the cutting (selection cut). Thirty-one trees per acre fell as a result of the storm, while only 19.7 trees per acre fell during the 14 to 17 year period following the selection cutting.

TABLE #7

Name of Fire	Location	Size (Acres)	Date
Wolf Creek	T. 55 N., R. 86 W.	1,280	9/1/09
Little Tongue	T. 55 N., R. 88 W.	5,000	8/27/10
Black Mountain	T. 55 N., R. 87 and 88 W.	4,990	9/3/16
Wolf Creek	T. 55 N., R. 87 W.	2,780	6/24/19
Rock Creek	T. 51 N., R. 84 W.	1,500	7/25/19
Bonanza	T. 54 N., R. 87 & 88 W.	1,600	8/23/19
Horse Creek	T. 54 N., R. 90 W.	1,265	7/14/31
Lodge Grass	T. 58 N., R. 91 W.	1,435	7/4/36
Duck Creek	T. 49 and 50 N., R. 84 and 85 W.	8,635	7/28/43

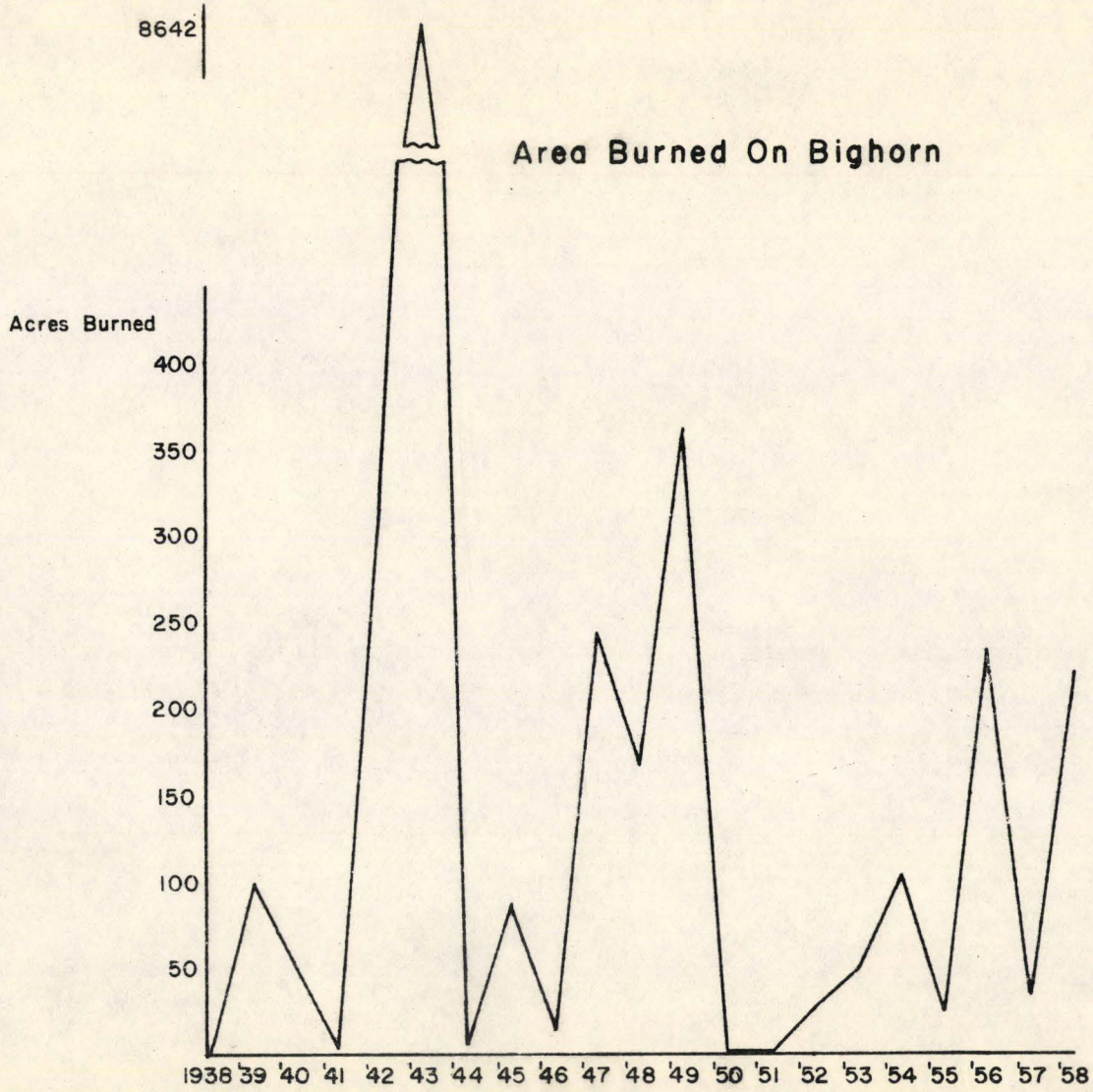


Figure 4

PSM 5/19/59

During May 21-22, 1952, wind caused noticeable losses of timber laden with 4 inches of wet, heavy snow in the Crazy Woman Creek and Canyon Creek drainages and near Powder River Pass.

Damage to timber stands from Chinook winds is considerable. During the winter of 1924-1925, severe winter-kill resulted from a Chinook wind between the elevations of 8000 and 8200 feet, mainly in the Tongue and Goose River drainages. A wind of January 21, 1943, in the ponderosa pine belt and extending from the Littlehorn drainage through Piney, caused noticeable damage in the altitudinal range of 5400 feet to 5700 feet. The ponderosa pine recovered from the wind fairly well, but most of the affected spruce died. Most of the loss from Chinook winds seems to occur on the northeast corner of the Bighorn Forest.

Long-range Needs

The objective is to dispose of overmature timber to build a reserve of healthy growing stock reaching maturity with a minimum of loss from natural factors.

Current Problems

Disposing of overmature stands of lodgepole pine infested with dwarf-mistletoe and preventing the infection of young stands is the Bighorn's biggest problem in forest protection. The first step is to develop an industry that will harvest the yearly allowable cut, and then manage the stand to control mistletoe. The publication, "Survey of Lodgepole Pine Dwarfmistletoe on the Roosevelt, Medicine Bow and Bighorn Forests", by Frank G. Hawksworth, Rocky Mountain Station paper 35, May, 1958, suggests management practices to control this disease.

Other problems from losses are of short term and involve recognizing them and treating them as they occur. Blowdowns or winter kill and other weather damage should be checked for insect buildups. Fire control is a yearly program that is well established.

LAND PROBLEMS

Rights-of-way

Because of the small amount of patented land, there are no foreseeable right-of-way problems on the main portion of the working circle. In a few instances, rights-of-way will be necessary to harvest timber adjacent to the forest boundary on the east and west sides. These units will not be programmed for sale in the first 10-year period.

Mining Claims

There are few mining claims that might affect timber management. With the surface right's determination that is to take place within the next 2 years, the relationship will be more clearly defined.

Acquisition Program

With the small amount of patented land, an acquisition program would have minor effect on timber management.

COORDINATION WITH OTHER USES

The National Forest Multiple-Use Land Management Plan for Eastern Wyoming gives the overall management objectives, direction, and priorities for the use of land within the forest. The commercial forest lands are within the intermediate zone and their management, along with that of water resources, has priority over wildlife and grazing.

In the travel influence and water influence zones, and in the special areas, land management priorities are for other than timber. In these latter zones and areas, the direction of timber management will be toward protecting and enhancing water and recreation values rather than toward attaining full production from the timber resource.

Water

In all zones, first consideration will be given to cutting practices which will protect and increase the water resource. No timber will be cut on unstable soil unless adequate measures are taken to prevent accelerated soil movement. Logging will not be done on extremely steep slopes unless damage to the site can be prevented through use of special logging equipment.

Timber sale contracts will require the purchaser to repair erosion damage caused by road construction and logging operations. Logging slash and debris will be kept out of streambeds so as not to impede or contaminate normal flow.

Recreation Areas

The forest supervisor may approve cutting of timber in developed recreation areas, or in those reserved for future development, when such cutting is for the purpose of protecting, improving, or maintaining a stand of timber suitable for the recreation use to be made of the area.

Slash and debris from trees cut within these areas will be completely abated.

Logging camps, mills and landings will be so located as not to lessen the recreation value of the area.

When logging is authorized within a reasonable distance of a heavily-used recreation area, the timber sale contract will require measures for public safety.

Waterfront Zone

The principles applying to Recreation Areas also apply to this zone. In addition, the contract will require the timber purchaser to conduct his operation in a manner that will not contaminate lakes or reservoirs or damage their value. No logging camps, mills, or landings will be permitted within this zone.

Streamside Zone

Streams which can produce fish will be retained in natural condition. Timber cutting will be limited to the removal of insect infested, diseased, and hazardous trees. Logging slash and other debris will be kept out of the streambed and off the banks. It will be completely abated.

No logging camps, mills or landings will be permitted within this zone.

Timber sale contracts will provide for prevention of polution and or damage to banks and natural stream channels.

Roadside Zones

For designated roadside zones, the forest supervisor may authorize cutting and removal of timber under condition specified in the Recreation Handbook (FSH 2312.3) for special demonstration purposes, for removal of insect infested or dead trees, for safety hazard reduction, or for thinning immature stands or essential clearing for approved purposes.

Wildlife

The alternate cut and leave strip and patch-cutting system, as practiced by the forest, is beneficial to wildlife. Openings will be retained in major plantations. The size and frequency of such openings will be prescribed in the planting plan.

Livestock

There is seldom any problem between timber and range management. Logging and other timber-use roads will be located so as to avoid natural parks and meadows when practicable and logging and milling debris will be kept out of such areas.

COOPERATION WITH OTHER AGENCIES

The Bureau of Land Management and the State have commercial timber areas near the south end of the forest. Timber management activities on the ranger districts involved should be coordinated with these agencies as feasible.

The State has cooperated in insect control projects and in fire control on its lands adjacent to the forest boundary.

SUPPORTING DATA

History

The Bighorn National Forest was created by proclamation of President Cleveland on February 22, 1897.

Because of the abundance of Bighorn sheep along the Bighorn River and in the adjacent mountain range before white settlement, the Indians gave the name of "Bighorn" to both.

The area in and around the Bighorn Forest was a bountiful hunting ground and the intrusion by the white man caused much resentment among the Sioux, Crow, and Cheyenne Indians, who lived and hunted in the region. Because of this, many bloody battles were fought between the Indians and the whites. The most notable were the battle of the Little Bighorn, in which General Custer and his command was wiped out, and the Fetterman massacre where a smaller unit of 81 soldiers was massacred in the foothills of the Bighorns.

Shortly after the creation of the Bighorn Forest Reserve, an examination of the forest was made by Professor J. G. Jack, of Harvard University, during the months of August and September, 1900. His report gives a complete description of the forest and the use being made of it at the time.

[1]The first logging in the Bighorns of which there is any record was conducted in 1866 when the Army cut timber for constructing Fort Phil Kearney at the mouth of Piney Creek near the present site of Story. The fort was abandoned in 1868. No further lumbering was undertaken until the establishment of Fort McKinney on Clear Creek in 1877. The lumbering operation initiated from Fort McKinney continued for several years and was extended into the mountains where all the forks of Clear Creek were driven.

From that time, various lumbering ventures were started on the eastern side of the Bighorns. In 1893, or perhaps the year before, a partnership of Hall and Starbaird obtained a large contract for ties from the Burlington Railroad. Cutting began on Sheep Creek, Tongue River, and the head of the Little Horn. Later the operation was sold to the J. H. McShane Timber Company, who extended cutting all over the Tongue River watershed and who continued to operate at intervals until 1908. About 120 MMBF were cut during this period.

Cutting on the west side of the range was started in 1895 by Gaylor and Perkins in Trapper Creek, and by Milo Burke on Brokenback Creek. From then on, various lumbering ventures were initiated from time to time in the western Bighorns. None of these operations was very large.

[1]From historical notes by A. G. Stockwell, Acting Forest Supervisor, July 29, 1915.

ECONOMY

Population of Communities

Map #2 shows towns surrounding the Bighorn Mountains and their respective populations.

Total dependent population is about 46,000, including town and rural population. The total population of towns is approximately 27,000.

Ranching

Livestock raising is the basic industry of the areas surrounding the Bighorn Mountains. There are 73,614 sheep and 27,075 cattle directly dependent upon Bighorn Forest grazing land for part of the year's forage.

Foothills ranches and farms are directly dependent upon the Bighorns for irrigation water, and municipal water supplies largely originate in the Bighorn Mountains.

Lumbering

Table #8 gives data on sawmills located in and around the Bighorn National Forest.

Recreation

Recreation is a growing industry in the Bighorns. There were 948,100 recreation visits during 1958. Of this number, 85,000 were primarily for fishing; 13,000 were primarily for hunting. Twenty-one lodges, resorts, and commercial packers are dependent for part of their year's income upon this recreational use.

Other Industry

Oil production is a growing industry immediately to the west of the Bighorn Mountains in the Bighorn Basin country.

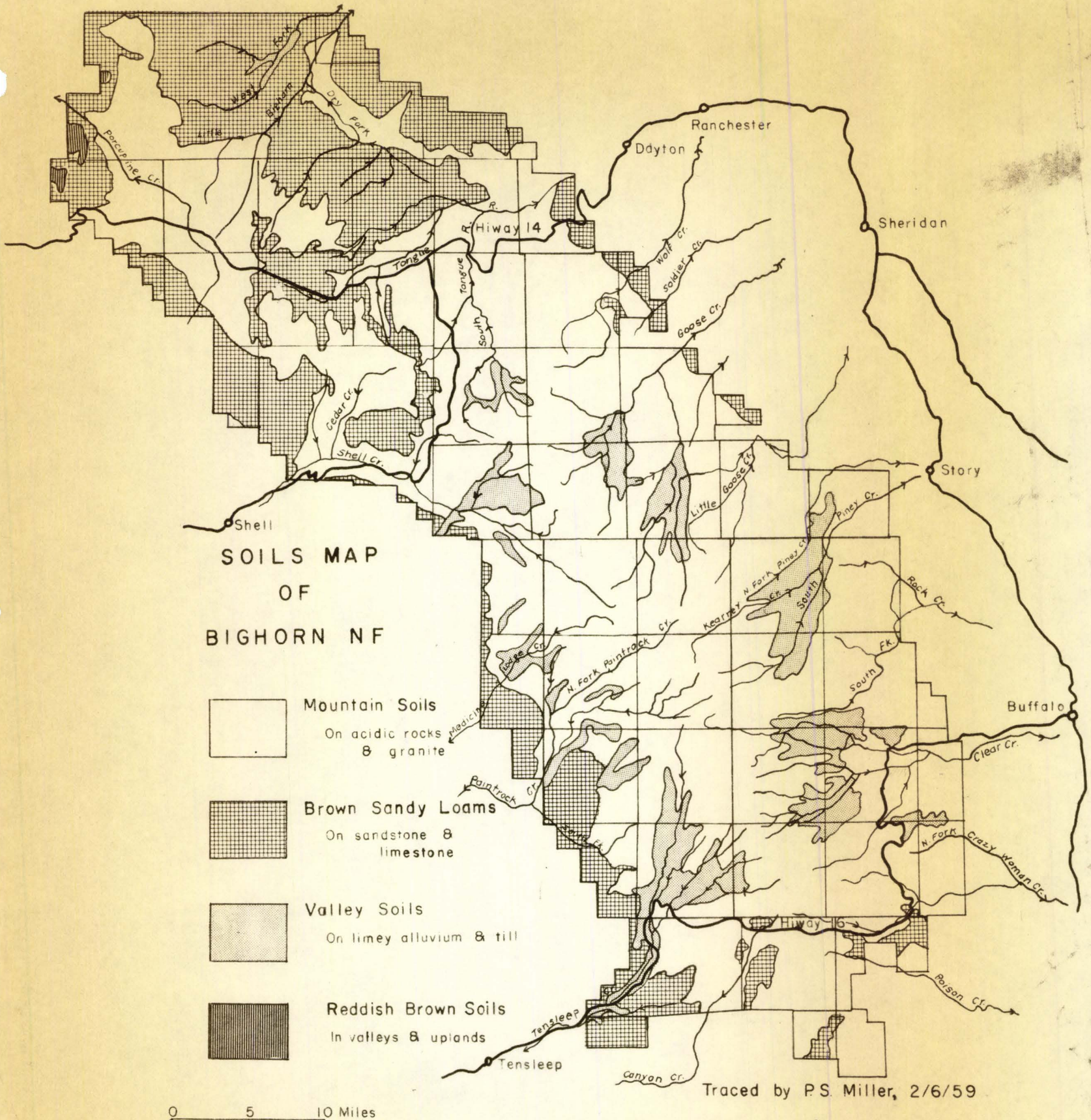
PHYSIOGRAPHY

Geology and Soils

The foundation of the Bighorn Mountains is granite. The granite uplift in the central ridge of the Bighorn Forest culminates in Cloud Peak and thrusts through a stratum of rock of more recent times that has eroded away, exposing the granite formation. [1]Glacial action has formed many great morainal heaps and rough, rocky ridges.

The surface sedimentary rock within the forest is divided between sandstone and limestone. Limestone predominates on the northern side of the forest and along the northeast and west sides.

[1]From Prof. Jack's report on the examination of the Bighorn Forest Reserve.



Traced by P.S. Miller, 2/6/59
from
U. of Wyo. Agr. Exper. Sta.
SOIL MAP, 1957

Map 3

The surface sedimentary rock within the forest is divided between sandstone and limestone. Limestone predominates on the northern side of the forest and along the northeast and west sides.

Because of the porosity of the limestone formation, moisture is lost to the surface over extensive areas, and the affected ridges and slopes are left very dry. On the bare, treeless and shrubless parks of the forest exposed to the westerly winds, there is little if any soil. Winds, rapid oxidation, grazing, and occasional fires have prevented the accumulation of humus.

Map #3 shows the distribution of soil types over the Bighorn Forest.

TOPOGRAPHY

The Bighorn mountain uplift is an isolated range arising from rolling plains country which is approximately 4,000 feet in elevation. The mountains rise to an elevation of 13,165 feet above sea level at the summit of Cloud Peak. From Cloud Peak high point, the ruggedly-glaciated, barren granite peaks break and slope off to the more gently rolling, timbered ranges and drainages that constitute the bulk of the Bighorn Mountains. Here the terrain assumes an almost plateau-like aspect ranging in elevation from 7,000 to 9,000 feet in altitude. As the gently declining topography approaches the forest boundary, it drops off suddenly into the sharply-incised drainages and precipitous slopes that arise from the surrounding plains and rolling foothills. This drop of altitude sometimes is in excess of 2,000 feet.

Little of the forest is below an altitude of 5,500 feet and the greater part of it exceeds 7,000 feet in elevation. Most of it lies within the 7,000 feet to 9,000 range.

CLIMATE

The precipitation patterns of the Bighorn Mountains are similar to those throughout the Rocky Mountains. On the plains east of the mountains, average annual precipitation ranges from 11 to 15 inches annually, while the plains country to the west is noticeably more arid with an average annual precipitation of 5 to 7 inches. From the eastern foothills of the Bighorns, at the lower limits of tree growth, precipitation averages about 15 inches annually and increases to an excess of 25 inches at elevations greater than 9,000 feet. At elevations of from about 7,400 feet to 9,000 feet, precipitation distribution of total through the year is approximately as follows: Period from November 1 through February, 24%; March through June, 48%; July through October, 30%.

Precipitation from about October 15 through May at elevations greater than 6,500 feet is mostly in the form of snow with a cumulative

snowfall of 150 to 200 inches at elevations near 9,000 feet and above. By May 1 snow normally accumulates over most of the forest at altitudes above 7,400 feet to depths ranging from about 20 inches at lower elevations of the Bighorn plateau to about 70 inches at elevations exceeding 9,000 feet.

Most snowmelt occurs during the period May 15 through June 15 with peak streamflow varying mostly from May 25 to June 15.

Five to six inches of precipitation occurs during the growing season. Most of this is in showers at the beginning of the growing season and at the end of the growing season in the form of snow. Above 9,500 feet, snow may fall at any time during the year.

The prevailing winds are westerly or southwesterly. Chinook winds during the winter are common, but seldom cause any excessive reduction of the snowpack except along the lower fringes of tree growth in the foothills at elevations less than 6,500 feet. The occurrence of extensive parks below timberline throughout the plateau, especially in the northwest portion of the forest may be partly the result of wind action detrimental to tree growth.

Maximum temperatures at elevations in excess of 8,500 feet seldom exceed 80° F. and minimum temperatures seldom drop below minus 30° F.

Variations of temperature in the mountains during the winter seldom show the extremes of those in the surrounding plains.

The growing season is from about May 20 through August. The average frost-free period is from about June 15 to August 20. Winters are long and cold and last from October 15 through April. At elevations above 9,000 feet, however, snowstorms and frost can occur at any time during the summer months.

TABLE #8

Name of Mill or Operator	Location	Principal Product or Products	Rated Capacity	Actual Production	Remarks
Cold Springs Lbr. Co.	Hyattville	Rough & S4S Lumber	4,000 M	2,500 M	7 Mo. Operation
Moses Bros.	Tensleep	Lumber	1,500 M	360 M	No N.F. Operation
S. H. Grisham & Sons	Greybull	Rough Lumber	1,000 M	300 M	New gang could double capacity
Shrum Lumber Company	Buffalo	Lumber	4,000 M	3,000 M	Operation all on N.F.
Alvin Johnson	Buffalo	Lumber	1,000 M	300 M	No logging on N.F.
Gordon Williams	West of Kaycee	Lumber	1,000 M	200 M	No logging on N.F.
Ray Pierson	West of Buffalo	Dry planed house logs	500 M	300 M	Operation all on N.F.
Andrew Hanson	West of Buffalo	Dry planed house logs	500 M	300 M	Operation all on N.F.
McIntosh Sawmill	West of Ranchester	Rough Lumber	1,500 M	1,000 M	All on N.F.
B&W Lumber Company	West of Ranchester	Rough Lumber	1,500 M	1,000 M	All on N.F.
Floyd and Delbert Ventling	West of Ranchester	Rough Lumber	1,000 M	600 M	Mill on private logs from N.F. lands

TABLE #9

REPORT OF TIMBER CUT AND SOLD SINCE 1915

BIGHORN NATIONAL FOREST

	Timber Sold				Timber Cut		
	No. Sales	MBF	Total Value	Average Sell. Price/M	MBF	Total Value	Avg. Sell. Price/M
1915 FY	29	609	$ 1,535	$2.52	435	$ 1,018	$2.34
1916 "	13	123	256	1.80	270	708	2.62
1917 "	23	433	1,040	2.40	323	727	2.25
1918 "	13	502	1,290	2.57	403	1,015	2.52
1919 "	17	393	996	2.53	200	378	1.89
1920 "	25	230	392	1.76	446	1,070	2.40
1921 "	38	944	1,828	1.97	579	1,342	2.32
1922 CY	32	762	1,378	1.82	333	592	1.78
1923 "	39	11,600	31,977	2.76	2,061	4,598	2.23
1924 "	42	1,649	4,347	2.64	1,144	3,054	2.67
1925 "	53	8,681	23,329	2.69	1,896	4,584	2.42
1926 "	52	1,170	2,146	1.83	3,222	11,055	3.43
1927 "	40	28,028	82,738	2.95	4,584	9,803	2.14
1928 "	58	1,850	3,486	1.88	6,744	16,993	2.52
1929 "	82	3,134	6,553	2.09	4,745	13,594	2.86
1930 "	89	2,645	6,672	2.52	6,458	16,017	2.48
1931 "	39	1,816	4,885	2.69	5,914	15,885	2.69
1932 "	46	636	995	1.56	825	1,475	1.79
1933 FY	48	1,169	1,848	2.08	863	1,411	1.63
1934 "	55	1,113	2,003	2.53	798	1,308	1.64
1935 "	65	1,567	2,862	1.83	2,032	3,457	1.70
1936 "	84	5,709	12,227	2.14	1,428	2,487	1.74
1937 "	78	6,323	15,260	2.41	2,809	6,178	2.20
1938 "	54	802	1,492	1.86	1,879	3,873	2.06
1939 "	46	673	1,448	2.15	1,291	2,690	2.08
1940 "	64	1,063	2,115	1.99	1,255	2,569	2.05
1941 "	61	665	1,384	2.08	1,244	2,385	1.92
1942 "	48	1,181	2,152	1.82	1,177	2,327	1.98
1943 "	30	1,110	1,896	1.71	1,291	2,900	2.25
1944 "	48	2,215	4,811	2.17	2,104	4,776	2.27
1945 "	43	5,746	13,395	2.33	3,028	6,529	2.16
1946 "	41	2.264	5,173	2.28	3,973	8,640	2.17
1947 "	62	34,573	129,214	3.74	6,704	18,232	2.72
1948 "	52	11,776	45,827	3.89	6,992	22,048	3.15
1949 "	35	2,539	4,860	1.91	8,675	30,537	3.52
1950 "	45	2,028	5,690	2.81	3,972	13,818	3.48
1951 "	87	5,305	20,199	3.81	6,296	23,676	3.76
1952 "	45	13,709	67,413	4.92	5,435	19,656	3.62
1953 "	62	3,461	13,482	3.90	8,999	45,773	5.09
1954 "	47	2,741	10,529	3.84	8,581	42,654	4.97
1955 "	52	2,821	6,796	2.41	10,996	55,304	5.03
1956 "		10,017	36,474	3.64	8,554	38,609	4.51
1957 "	67	3,042	12,740	4.19	9,183	40,397	4.40
1958 "	187	9,124	23,349	2.56	7,796	21,275	2.73

COMPARTMENT MAP OF THE BIGHORN WORKING CIRCLE

Compartments of Bighorn Working Circle

Bighorn National Forest

1 - Buffalo Block

001 Rock
002 Primitive
003 Hunter
004 Sourdough
005 Caribou
006 Hazleton

2 - Goose Block

007 Walker
008 Dome
009 Geneva
010 Cross
011 Lamburger
012 Piney

3 - Medicine Wheel Block

013 Little Horn
014 Porcupine
015 South

4 - Paintrock Block

016 Copeman
017 Canyon
018 Antelope
019 Shell
020 Trapper
021 Lakes
022 Basin
023 Cloud Peak

5 - Tensleep Block

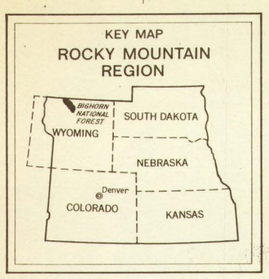
024 Granite
025 Soldier
026 Tyrrell
027 East
028 Leigh
029 Webb

6 - Tongue Block

030 Ridge
031 Dry Fork
032 North Tongue
033 Burgess
034 Freezeout
035 Sibley
036 Steamboat
037 Woodrock

Montana Principal Meridian
Sixth Principal Meridian

KEY MAP
ROCKY MOUNTAIN REGION



LEGEND

Block Boundary
Compartment Boundary

12 - 1 - 58

LEGEND

- National Forest boundary
- Highway, hard surface
- Good motor road, graded gravel
- Motorway, improved dirt
- Poor motorway, unimproved dirt
- Trail
- Railroad
- Telephone line
- Power line
- Municipal and other airports
- U.S. Highway No.
- State Highway No.
- County road No.
- Forest road No.
- Supervisor's Headquarters } Report fires here
- District ranger station
- Guard or ranger station (Not permanently occupied)
- Fire tool cache
- Improved forest camp ground
- Improved picnic ground
- Permanent lookout station
- Triangulation station
- House, cabin or other building
- Schoolhouse
- Sawmill
- Wilderness area (100,000 acres or more)
- Wild area (less than 100,000 acres)
- Natural area

National Forest land

Compiled from U.S.G.S., Forest Service and other surveys. Denver, Colo. 1956.

Longitude west from Greenwich

Polyconic projection
North American datum